C L A I M S

1. An electromagnetic field stimulator device for Anatomic Biophysical Chondroprotection, in which means of current generation (7, 18 and 20) are suitable for powering at least one solenoid (24) to generate an electromagnetic field directed on a part of the human body (26) including cartilaginous tissue (27),
characterized in that the said means of current generation (7, 18 and 20) supplies said solenoid (24) with current (i(t)) having a waveform that includes the repetition of a ramp with a certain slope; said current (i(t)) causing the generation of an electromagnetic field that induces on a control probe (32) irradiated by said electromagnetic field, a voltage (Vin) of markedly constant amplitude during the ramp-like linear growth period of said current (i(t)).

2. A device according to claim 1, in which said means of current generation includes at least one table (7) in which at least one function (f(t)) is stored that provides, for each value of a scanning signal in input (sc), an output value that expresses a target current intensity (Iout), the said function f(t) being a linear one and representing a ramp with a certain slope that supplies, for increasing values of said scanning signal in input (sc), linearly increasing values of said target current intensity (Iout).

3.- A device according to claim 2, in which said table (7) contains a number of functions (f(t)) of different, selectable types.

4.- A device according to claim 2, in which timer devices (3 and 4) are provided that are suitable for generating said scanning signal in input (sc).

5.- A device according to claim 2, in which attenuator devices

(10) are provided with their input communicating with the output of said table (7), said attenuator devices (10) being suitable for reducing the value of said target current intensity (Iout) in function of a programmable parameter (IPK) to limit the maximum value of said current (i(t)) feeding said solenoid (24).

6.- A device according to claim 1, in which a feedback system (28, 29, 30, 12 and 14) is provided that performs continuous monitoring of said current (i(t)) present in said solenoid (24), comparing (12) a measured current value (Imis) with a reference value (7, Iout); in cases of variances between the two said values, due to changes in impedance of said solenoid (24), said feedback system automatically takes care of adjusting the value of said current (i(t)) feeding said solenoid (24) in order to maintain the waveform of said induced voltage (Vin) unaltered.

7.- A device according to claim 6, in which said feedback system (28, 29, 30, 12 and 14) includes:

- detector devices (28 and 29) suitable for supplying said measured current value (Imis), and
- subtraction devices (12) suitable for generating an error signal in function of said measured current value (Imis) and of said reference value (7, Iout).

8. A device according to claim 7, in which a generator circuit (18 and 20) is provided that receives said error signal in input and generates an alternating analogue power signal (S(t)) having a fixed frequency and variable duty cycle in function of said error signal, said variable duty cycle being suitable for regulating the intensity of said current (i(t)).

9. A device according to claim 8, in which said generator circuit (18 and 20) includes a pulse width modulator (18).

10.- A device according to claim 8 or 9, in which low-pass filter devices (22) are provided between the output of said generator circuit (18 and 20) and the said solenoid (24).

11.- A device according to claim 1, in which said solenoid (24) is made from a number of sheets of a flexible material to adapt itself to the shape of said portion of the human body (26).

12.- A method for Anatomic Biophysical Chondroprotection, comprising the phases of:

- generating an electromagnetic field and applying it to a portion of the human body (26) including cartilaginous tissue (27),

characterized by the fact that said phase of generating an electromagnetic field includes the phase of:

- powering a solenoid (24) with current (i(t)) having a waveform that includes the repetition of a ramp with a certain slope, said current (i(t)) causing the generation of an electromagnetic field that induces on a control probe (32) irradiated by said electromagnetic field, a voltage (Vin) of markedly constant amplitude during the period of ramp-like linear growth of said current (i(t)).

13.- A method according to claim 12, in which said current (i(t)) presents an intensity and said solenoid (24) presents a configuration such that said electromagnetic field penetrates in depth into said portion of the human body (26) until it permeates said portion of cartilage (27) and a portion of subchondral bone associated with said portion of cartilage (27) over their entire thickness and in their entire extension, to activate at least one of the following processes at intracellular level:

- a process of articular inflammation control regarding both subchondral bone and the articular structures,
- a process of articular inflammation control capable of

acting in a specific manner on the adenosinic receptors A_{2A} of the cell membrane of pro-inflammatory cells, neutrophils, doubling the number of bonds with adenosine,

- a process of inhibiting the catabolic effect of inflammatory cytokines acting directly on the chondrocite and on the cartilaginous matrix,
- a process of increasing the metabolic activity of chondrocites and the synthesis of proteoglycans,
- a process of inhibiting degeneration of articular cartilage, preserving the integrity of the same articular cartilage,
- a process of rapid healing of subchondral bone tissue,
- a process of healing bone marrow edema regarding the subchondral bone of femoral condyles, and
- a process of healing and integration of bone grafts after ligament reconstruction operations on the fibrous flexor sheaths of the knee.

14.- A method according to claim 12 or 13, in which said current presents an intensity and said solenoid (24) presents a configuration such that said electromagnetic field penetrates in depth into said portion of the human body (26) until it permeates said portion of cartilage (27) and a portion of subchondral bone associated with said portion of cartilage (27) over their entire thickness and in their entire extension, to activate, in the presence of an osteo-cartilaginous graft, a preservation process for the viability of said portion of cartilage (26) and trigger at least one of the following effects:

- inhibition of reabsorption phenomena on the underlying bone,
- rapid anchorage of graft,
- good osteointegration of graft, and
- inhibition of the formation of bone cysts.

15.- A method according to claim 12, in which said solenoid (24) is made from a number of sheets of a flexible material to adapt itself to the shape of said portion of the human body (26).